

CLAIMS

- 5 1. Method for handling substantially rod-shaped objects, particularly poles of articles individually stacked in one another, such as plastic cups, during loading processes in conjunction with a loading aid, particularly a carton, the objects to be handled being made available in a first geometrical arrangement by a manufacturing or processing machine, characterized in that initially at least part of the objects is gripped, that subsequently a relative mutual arrangement of the objects is modified and that then the modified arrangement of the objects is deposited in the loading aid, the objects being arranged in upright standing manner.
- 10 2. Method according to claim 1, characterized in that the objects are gripped by means of a first gripping device and that the change to the object arrangement takes place by modifying a geometry of the first gripping device.
- 15 3. Method according to claim 2, characterized in that the first gripping device is operated by a handling device, particularly a multiaxial industrial robot.
- 20 4. Method according to claim 2 or 3, characterized in that each object is gripped and held by an associated gripping element of the first gripping device.
- 25 5. Method according to claim 4, characterized in that the modification to the geometry of the first object arrangement takes place by modifying a spacing of the gripping elements.
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6. Method according to one of the claims 1 to 5, characterized in that, prior to placing in the loading aid, the objects are deposited in associated storage elements of magazine means.

7. Method according to claim 6, characterized in that an arrangement geometry of the objects is modified in the magazine means.

8. Method according to claim 5 or 7, characterized in that the geometry change takes place between a first position predetermined on gripping the objects and a second relative position predetermined by a sought packing density in the loading aid with respect to the gripping elements and/or storage elements.

9. Method according to one of the claims 6 to 8, characterized in that subsequently a second geometrical arrangement of the objects is removed from the magazine means by a second gripping device.

10. Method according to claim 9, characterized in that the second gripping device is operated by a handling device, particularly a multiaxial industrial robot.

11. Method according to claim 9 or 10, characterized in that removal takes place rowwise or blockwise.

12. Method according to one of the claims 6 to 11, characterized in that a length of the object rows in the magazine means corresponds to a dimension of the loading aid.

13. Method according to one of the claims 1 to 12, characterized in that a positioning insert is introduced into the loading aid prior to the deposition of the objects.
- 5 14. Method according to claim 13, characterized in that objects with mutually parallel rod axes are brought with one of their rod ends into receiving means of the positioning insert.
- 10 15. Method according to one of the claims 1 to 14, characterized in that, following deposition of the objects, the loading aids are stored or conveyed for a further processing of the articles, such as decorating or filling.
- 15 16. Method according to claim 15, characterized in that the objects for further processing of the articles are removed from the loading aid by means of a further gripping device (removal device).
- 20 17. Method according to claim 16, characterized in that the objects are removed rowwise from the loading aid.
18. Method according to claim 16 or 17, characterized in that the removal device is operated by a first handling device,
25 particularly a multiaxial industrial robot.
19. Method according to one of the claims 16 to 18, characterized in that the objects are removed from the loading aid and then redeposited therein by a common handling device,
30 particularly a multiaxial industrial robot.
20. Method according to one of the claims 1 to 19, characterized in that a lining present in the loading aid and in particular a plastic bag is spread out during deposition

and/or removal of the objects and applied to the walls of the loading aid.

21. Method according to one of the claims 1 to 20, characterized in that the loading aid is inclined relative to the vertical during deposition and/or removal of objects.

22. Method according to claims 20 and 21, characterized in that the inclination of the loading aid and the spreading out/application of the lining takes place in a spreading station provided for this purpose.

23. Device for handling substantially rod-shaped objects, particularly poles of articles which can be individually stacked in one another such as plastic cups, following the provision thereof to a corresponding manufacturing or processing machine in a first geometrical arrangement during loading processes in conjunction with a loading aid, particularly a carton, characterized by a first gripping device (4.1), which is constructed for gripping at least part of the objects (9) at an interface (2.1) with the manufacturing or processing machine (2) and for the deposition of the objects (9) in an upright standing manner.

24. Device according to claim 23, characterized in that the first gripping device (4.1) is constructed for modifying the geometry of the object arrangement prior to deposition in the loading aid (7.1).

25. Device according to claim 23 or 24, characterized in that there are magazine means (8) for depositing the objects (9) contained in the first gripping device (4.1) prior to deposition in the loading aid (7.1).

26. Device according to claim 25, characterized in that the magazine means (8) is constructed for receiving objects (9) with parallel rod axes in an arrangement of rows.

5 27. Device according to claim 25 or 26, characterized in that the magazine means (8) are constructed for modifying the geometry of the object arrangement.

10 28. Device according to one of the claims 23 to 27, characterized in that the first gripping device (4.1) has for each object (9) an associated gripping element (4.1c).

15 29. Device according to one of the claims 25 to 28, characterized in that the magazine means (8) have an associated storage element (8.1c) for each object (9).

20 30. Device according to claim 28 or 29, characterized in that the gripping elements (4.1c) and/or storage elements (8.1c) have lateral guidance means (4.1g, 8.1g) for the object (9) held.

25 31. Device according to claim 30, characterized in that in the guidance elements (4.1) of at least the gripping elements (4.1c) are integrated closure means (4.1a) for retaining the objects (9).

30 32. Device according to claim 30 or 31, characterized in that the guidance means (4.1g, 8.1g) are constructed for the parallel orientation of the rod axes of objects (9).

33. Device according to one of the claims 28 to 32, characterized in that at least one group (4.1b, 4.1b') of gripping elements (4.1c) is arranged in a row.

34. Device according to one of the claims 29 to 33, characterized in that at least one group (8.1b, 8.1b') of storage elements (8.1c) is arranged in a row.

5 35. Device according to claim 33 or 34, characterized in that at least the gripping elements (4.1c) and/or the storage elements (8.1c) of the group (4.1b, 4.1b'; 8.1b, 8.1b') are movably arranged.

10 36. Device according to claim 35, characterized in that the gripping elements (4.1c) and/or storage elements (8.1c) are movable in a direction (X) perpendicular to the rod axis of the objects (9) held.

15 37. Device according to one of the claims 33 to 36, characterized in that the gripping elements (4.1c) and/or storage elements (8.1c) of the group (4.1b, 4.1b'; 8.1b, 8.1b') are slidably arranged on a rail element (4.1d, 8.1d) extending in the direction of the row.

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38. Device according to one of the claims 33 to 37, characterized in that a mutual lateral spacing (d1, d2) of gripping elements (4.1c) and/or storage elements (8.1c) is variable within the row.

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39. Device according to claim 38, characterized in that by means of the lateral spacing (d1, d2) it is possible to modify a first position of gripping elements (4.1c) and/or storage elements (8.1c) preset on gripping the objects (9) with respect to a second position of the gripping elements (4.1c) and/or storage elements (8.1c) preset through a sought packing density in the loading aid (7.1, 7.2).

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40. Device according to one of the claims 33 to 39, characterized in that the gripping elements (4.1c) and/or storage

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elements (8.1c) of the group (4.1b, 4.1b'; 8.1b, 8.1b') are connected by connecting means (4.1h, 8.1h) to the in each case adjacent gripping element (4.1c)/storage element (8.1c) or gripping elements (4.1c)/storage elements (8.1c),
 5 through which two relative positions with two different pairwise lateral spacings (d1, d2) of gripping elements (4.1c)/storage elements (8.1c) are defined.

41. Device according to claim 40, characterized in that
 10 there is an individual power source for moving the gripping elements (4.1c)/storage elements (8.1c) for each group (4.1b, 4.1b'; 8.1b, 8.1b') of gripping elements (4.1c)/storage elements (8.1c).

15 42. Device according to one of the claims 25 to 41, characterized in that there is a second gripping device (4.2) for removing a second geometrical arrangement of objects (9) from magazine means (8).

20 43. Device according to claim 42, characterized in that the second gripping device (4.2) is constructed for the rowwise or blockwise removal of objects (9) from magazine means (8).

25 44. Device according to one of the claims 23 to 43, characterized in that there is a positioning insert (13) in loading aids (7.1, 7.2).

45. Device according to claim 44, characterized in that the
 30 positioning insert (13) has reception means (13.2, 13.2', 13.2") for objects (9) into which the latter can be introduced with one of their rod ends.

46. Device according to one of the claims 23 to 45, characterized in that there is a further gripping device (4.3)
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for removing the objects (9) (removal device) from loading aid (7.2).

47. Device according to claim 46, characterized in that the
5 removal device (4.2) is constructed for the rowwise removal of objects.

48. Device according to claim 46 or 47, characterized in
that the removal device (4.3) for each object (9) to be re-
10 moved has a shell arrangement (17) formed from at least two half-shells (17.1, 17.2) rotatable relative to one another about a common axis for receiving the object (9), said object (9) being receivable in a space constructed within the shell arrangement (17) and is held therein by retaining
15 means (22) provided at one end (17b) of shell arrangement (17).

49. Device according to claim 48, characterized in that
there is a drive (19) for the joint rotation of the half-
20 shells (17.2) of shell arrangement (17) of removal device (4.3).

50. Device according to claim 46 or 47, characterized in
that the removal device (4.3) for each object (9) to be re-
25 moved has a clamping device formed from underengaging means (4.3a, 4.3c) for underengaging the object (9) and a hold-down means (4.3b) for clamping the object (9) between underengaging means (4.3a, 4.3c) and hold-down means (4.3b).

30 51. Device according to one of the claims 23 to 50, characterized in that there are conveying means (6, 12) for conveying the loading aid (7.2) to a further processing device (11) for the articles (9.1), such as a decorating or filling device, or to a storage device.

52. Device according to one of the claims 46 to 51, characterized in that after further processing of articles (9.1), the objects (9) are deposited by means of a further, particularly first or second gripping device (4.1, 4.2) or the gripping device (4.4) corresponding to removal device (4.3) in loading aid (7.1) again.

53. Device according to one of the claims 23 to 52, characterized in that there is a spreading station (14) for spreading out and simultaneously applying a lining (15), particularly a plastic bag present in the loading aids (7.1, 7.2) against the wall (7.1a, 7.2a) of loading aids (7.1, 7.2) during the deposition of objects (9).

54. Device according to claim 53, characterized in that the spreading station (14) is constructed for inclining the loading aids (7.1, 7.2) against the vertical (V) during the deposition of objects (9).

55. Device according to one of the claims 23 to 54, characterized in that the first gripping device (4.1) is operable by a handling device (3.1), particularly a multiaxial industrial robot.

56. Device according to one of the claims 42 to 55, characterized in that the second gripping device (4.2) is operable by a handling device (3.2), particularly a multiaxial industrial robot.

57. Device according to one of the claims 46 to 56, characterized in that the removal device (4.3) is operable by a handling device (3.3), particularly a multiaxial industrial robot.

58. Device according to one of the claims 52 to 57, characterized in that the further gripping device (4.4) is operable by a handling device (3.4), particularly a multiaxial industrial robot.

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